

DRAFT DISPOSAL FACILITY SITING TECHNICAL MEMORANDUM

PORTLAND HARBOR SUPERFUND SITE

Prepared for



Prepared by

Anchor Environmental, L.L.C.
1411 4th Avenue, Suite 1210
Seattle, Washington 98101

March 2002

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.



**DRAFT DISPOSAL FACILITY SITING TECHNICAL
MEMORANDUM**

PORTLAND HARBOR SUPERFUND SITE

Prepared for

Lower Willamette Group

Prepared by

Anchor Environmental, L.L.C.

1411 4th Avenue, Suite 1210

Seattle, Washington 98101

March 2002

*DRAFT DOCUMENT: DO NOT QUOTE OR CITE
This document is currently under review by US EPA and its federal,
state and tribal partners, and is subject to change in whole or part.*



Table of Contents

1	INTRODUCTION	1
2	DISPOSAL SITE TYPES	2
3	GENERAL SITING PROCESS.....	5
4	STEP 1: DEFINE GEOGRAPHIC LIMITS	9
5	STEP 2: VOLUME ASSUMPTIONS	11
6	STEP 3: PRELIMINARY SCREENING AND DISPOSAL SITE INVENTORY REPORT	12
6.1	Criteria That Apply to All Disposal Options	12
6.1.1	Criterion 1: Site Size	12
6.1.2	Criterion 2: Steepness.....	13
6.1.3	Criterion 3: Threatened or Endangered Species.....	13
6.1.4	Criterion 4: Designated Parks, Sanctuaries, and Refuges	14
6.1.5	Criterion 5: Tribal Land	14
6.1.6	Criterion 6: Seismic Risk.....	14
6.2	Criteria That Apply to Upland Disposal	14
6.2.1	Criterion 7: Land Use	14
6.2.2	Criterion 8: Wetlands	15
6.3	Criteria That Apply to Nearshore and Aquatic Disposal.....	15
6.3.1	Criterion 9: Navigation Channels and Water Dependent Use.....	15
6.3.2	Criterion 10: Sensitive or Critical Aquatic Habitats	15
6.3.3	Criterion 11: Tribal or Recreational Fishing Areas	16
6.3.4	Criterion 12: Surface or Groundwater Discharge Areas	16
6.3.5	Criterion 13: Currents	16
6.4	Criteria That Apply to Aquatic Disposal.....	17
6.4.1	Criterion 14: Mudline Slope	17
7	STEP 4: VOLUME AND OTHER CHARACTERISTICS REFINEMENT	18
8	STEP 5: RESCREEN SITES (OPTIONAL).....	19
9	STEP 6: FINAL SITE RANKING.....	20
9.1	Disposal Site Effectiveness	20
9.2	Disposal Site Implementability	22
9.3	Disposal Site Cost.....	23
9.4	Final Site Ranking	24
10	REFERENCES.....	26
	Figure 1. Draft Disposal Facility Siting Process Flow Chart	7
	Figure 2. Draft Flow Chart – Relationship of Facility Siting Process to Feasibility Study	8

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



List of Acronyms and Terms

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DMMS	Dredged Material Management Study
EPA	Environmental Protection Agency, U.S.
FS	Feasibility Study
ISA	Initial Study Area
LWG	Lower Willamette Group
NMFS	National Marine Fisheries Service
NRDA	Natural Resource Damage Assessment
ODFW	Oregon Department of Fish and Wildlife
ONHP	Oregon Natural Heritage Program
RA	Risk Assessment
RI	Remedial Investigation
ROD	Record of Decision
Site	Portland Harbor Superfund Site
SOW	Statement of Work
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.



1 INTRODUCTION

This Draft Disposal Facility Siting Technical Memorandum proposes a process to identify and obtain contaminated sediment disposal site options for the Portland Harbor Superfund Site (Site) administered by the U.S. Environmental Protection Agency (EPA). This memorandum has been prepared to fulfill specific requirements of the Administrative Order on Consent (AOC; Docket No CERCLA – 10-2001-0240) and accompanying Statement of Work (SOW) between the members of the Lower Willamette Group (LWG) and EPA. It is important to note that this memorandum proposes and describes an appropriate process and methods for disposal facility siting, but does not contain the results of conducting the facility siting evaluation. The facility siting evaluation will be conducted once EPA has reviewed and approved the process and methods proposed in this document.

This memorandum is one element of a larger Remedial Investigation (RI) and Feasibility Study (FS) that was recently initiated for the Site. Dredging and disposal of contaminated sediments is one potential remedial option that will be evaluated in the FS for the Site. The process for locating potentially suitable disposal sites is the focus of this memorandum. Other potential remedial options that may be evaluated in the overall FS, such as capping in place, natural attenuation, and treatment, are not considered in this memorandum.

The overall RI/FS will eventually identify the extent and volume of any contaminated sediments that may need to be dredged. However, the locations and volumes of these sediments have not been identified at this time. Consequently, the process for locating potentially suitable disposal sites is necessarily general at this point and encompasses a wide range of potential scenarios that could eventually result from the RI/FS. This includes the use of single or multiple facilities for sediment disposal and remediation of sediments all at once or in phases.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.



2 DISPOSAL SITE TYPES

For the purposes of this memorandum, disposal sites are defined as those areas, either in the upland, nearshore, or aquatic environments that might be suitable for the placement of contaminated sediments. Under this definition, the site is considered a designated facility for the permanent disposal of sediments that would be maintained and monitored. Definitions of disposal site types are:

- **Upland Disposal Sites:** Upland disposal sites are facilities above the ordinary high water mark. Use of upland sites can involve hydraulic dredging and pipeline transport to the disposal site. Alternatively, dredging and disposal can be performed by mechanical methods, followed by rehandling of sediments possibly with transport by barge, truck, or rail to the disposal site. Provisions are required for the management of entrained water during the sediment handling and dewatering process. Upland disposal includes alternatives that may involve siting one or more new upland facilities exclusively or partially for disposal of this Site's sediments or use of a pre-existing publicly or privately operated landfill.

Upland disposal site design features often include bottom and surface liners or impermeable layers and/or a surface cap. The facilities surfaces could be a variety of materials and could allow for a variety of uses on top of facilities after they are constructed (e.g., parks, parking, recreation areas, and commercial development). A water collection and treatment system for controlling leachate over the long term could be required. If the disposal site is a pre-existing landfill, these features may already be in place and managed by the operator of that landfill.

- **Nearshore Disposal Site:** Nearshore disposal sites involve dredging and placing sediments in a shoreline location below ordinary high water surrounded by a berm or dike on the water side of the facility. Dredging and placement can be achieved through hydraulic or mechanical (with rehandling) methods. Dewatering is not necessary. Contaminated sediments are placed within the saturated zone. A cap can be placed over the dredged sediments for isolation and to construct an upland area above ordinary high water. Land use on the surface of such facilities could include the same options as described for upland facilities. Alternatively, the surface of a nearshore facility could be

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



below ordinary high water and could be designed to provide aquatic and nearshore habitat features.

- **Aquatic Disposal Site:** Aquatic disposal involves dredging, transport, and placement of the sediments in an aquatic environment, usually followed by covering with clean cap sediments. In some cases, unconfined (without a cap) aquatic disposal can also be appropriate. Dredging and disposal can take place hydraulically or mechanically. Mechanical disposal can involve rehandling by mechanical dredge or placement by bottom dump barge. In areas of high energy or scour, a cap must be adequately protected with a gravel or rock covering.

Variations of aquatic disposal include disposal in natural depressions, disposal on a flat or gentle slope, and excavation to create depressions followed by placement of contaminated sediments in the resulting pits. Confinement berms can be constructed at aquatic sites to prevent the dredged material from moving downhill, which allows for construction on somewhat steeper slopes.

In most cases when dealing with “contaminated” sediments, remediation requires some type of confinement (such as a cap) to isolate chemicals in the sediments. Although some type of confinement is generally assumed for the purpose of this memorandum, this assumption should not be inferred to exclude any option from FS evaluation that potentially meets the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) requirements for remediation. This could include reuse of materials either in aquatic or upland environments for development, habitat enhancement, or other purposes. Further, some options might involve placement of sediments after they have been treated to some extent. Treated sediments may not require confinement. Feasibility study evaluations of remedial alternatives that include any type of disposal site will be conducted consistent with CERCLA FS criteria to determine the final suitability of any site/remedial option regardless of whether it involves confined or unconfined disposal alternatives.

Some types of dredging and disposal operations (particularly for upland sites) require sites to rehandle or dewater sediments. In some cases, these activities can take place on a portion of the site that will be the final destination of the sediments (i.e., the disposal site). In other cases,

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



separate sites are needed for rehandling or dewatering prior to transport of the sediments to the disposal site. The process described in this memorandum does not explicitly evaluate rehandling or dewatering sites. However, the initial disposal site inventory will yield a list of sites that will be potentially suitable for those purposes. Consequently, as remedial alternatives are developed in the FS process, the disposal site inventory results will be used to identify potentially suitable rehandling and/or dewatering sites.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

*This document is currently under review by US EPA and its federal,
state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.*



3 GENERAL SITING PROCESS

The factors that must be considered when siting disposal facilities generally fall into the following categories:

- Technical/Regulatory – facilities must be of sufficient size, constructible, stable, accessible, consistent with Applicable or Relevant and Appropriate Requirements (ARARs), and available for use
- Environmental – facilities must be able to adequately minimize contaminants from entering the surrounding environments (human and ecological) and not cause unacceptable impacts to the pre-existing habitat at or near the site
- Economical – the facilities' construction costs must be relatively consistent with other equally effective options
- Community – there must be community and political acceptance to the location, appearance, and ancillary uses of facilities.

More specific factors could be mentioned, but most of these fall into one or more of the above general categories. A disposal facility siting evaluation must sift through a substantial number of possible sites based on the above general criteria in an efficient manner. Consequently, our general approach uses an iterative screening process to efficiently winnow down the number of realistic possibilities.

With these general considerations in mind, this memorandum defines the following steps for identifying potential disposal sites:

1. Define the geographic limits of the study area to be considered for facility siting.
2. Make necessarily simple assumptions about the volume of sediments to be disposed.
3. Evaluate the study area for sites of appropriate size (given Step 2 volume assumptions) and use preliminary screening criteria to create a preliminary inventory of sites.
4. Determine the specific volume, and the chemical, physical, and geotechnical characteristics of the sediments to be disposed (information from the FS process).
5. Optional step that rescreens sites from Step 3 to create a refined site list, based on the information from Step 4 and any additional useful criteria that become evident from the information gathered in Step 4. (If Step 4 information is insufficient to further refine the site list we will skip this step and go directly to Step 6.)

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.



6. Conduct a brief evaluation of each site on the refined list using CERCLA-based criteria to arrive at a final ranked list of potential sites.

These steps (and how they fit into the overall RI/FS process) are shown in Figures 1 and 2. Although this memorandum is primarily concerned with disposal facility siting evaluation **methods**, some preliminary results regarding Steps 1 and 2 are presented below. For the remaining steps, only methods are discussed (as opposed to conducting the evaluation and presenting results).



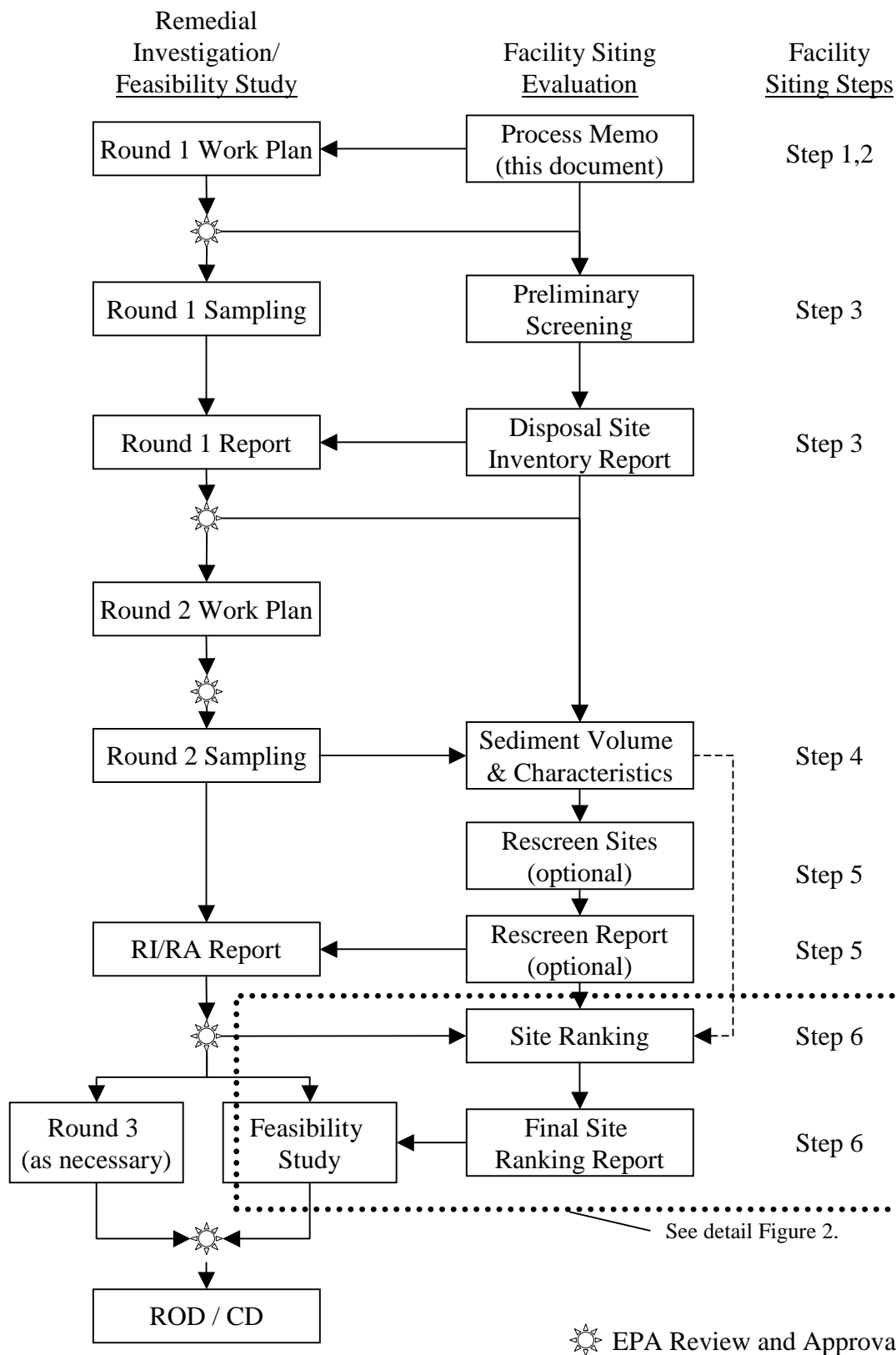


Figure 1. Draft Disposal Facility Siting Process Flow Chart

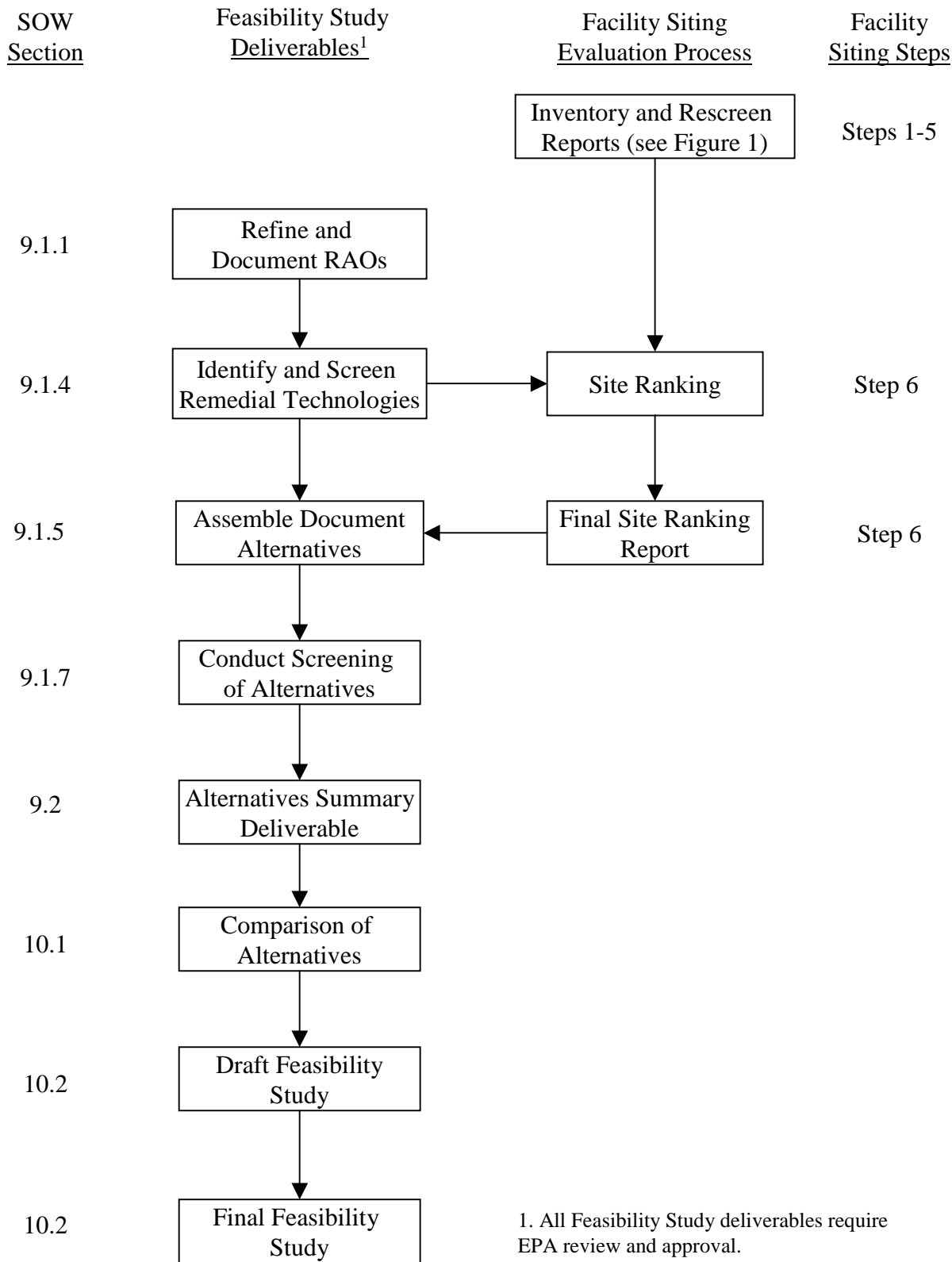


Figure 2. Draft Flow Chart – Relationship of Facility Siting Process to Feasibility Study

4 STEP 1: DEFINE GEOGRAPHIC LIMITS

The Disposal Facility Siting Evaluation must be conducted within a defined geographic context and limitations. This provides a way to quickly eliminate sites that are too distant to be economically feasible under any circumstances. However, the geographic limits must not be so restrictive as to preclude options that are relatively cheap in terms of final disposal costs, and therefore, could be cost competitive even given relatively high transport costs.

Because two of the three disposal options are water dependent, the geographic limitations can be initially defined based on distances up and downstream from the site. The upstream limit for large-scale navigation on the Willamette River is the Willamette Falls at Oregon City, about 20 miles from the Initial Study Area (ISA). A reasonable upstream limit in the Columbia River is the Bonneville Dam (Columbia River mile 145) about 44 miles from the Site.

There is no obvious downstream limit for this study on the Columbia River. In their 1996 Dredge Material Management Study, the Port of Portland limited their evaluation downstream to Sauvie Island (about 15 miles from the Site), upstream to the Bonneville Dam (Multnomah County line) on the Columbia River, and upstream to the Sellwood Bridge on the Willamette River (just above Ross Island). A downstream limit similar to the Port of Portland study also appears reasonable for this facility siting process. The Port study upstream limit for the Willamette River also appears reasonable because the river becomes relatively channelized above this point with mostly steep slopes on both sides of the river, creating few prospects for upland, nearshore, or aquatic disposal sites.

Based on these general considerations, the following geographic limitations for an in water disposal site appear reasonable:

- Upstream on the Willamette River to just above Ross Island
- Upstream on the Columbia River to Bonneville Dam
- Downstream on the Columbia River to Sandy Island (about 24 miles from the Site).

There are potentially many more sites further downstream on the Columbia River (USACE 1998). Consequently, if viable prospects in this area become known during the course of the facility siting process, this downstream limit may be further expanded.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



Upland disposal options can be broken down into two categories: (1) new sites that are built and maintained for the project, and (2) pre-existing publicly or privately owned and operated sites. Consequently, two geographic limits are proposed for upland sites:

- New upland sites will be limited to those areas within 1 mile of the river's edge within the geographic area defined for aquatic sites
- Pre-existing sites will be limited to those landfills within Oregon and Southern Washington State currently operating and accepting fill material.

Confining the search for new upland sites to the river corridors is reasonable because it is expected that water transport would be one of the most economical methods for transport of sediments to an upland site. Further, upland sites along the river will have a viable location for discharge of large amounts of water. Rail is another potentially viable transport option that is preserved with these criteria because all of the major rail lines also follow these river corridors.

All of these geographic limits are somewhat arbitrary and based on professional judgment given the information available at this time. They provide a reasonable context in which to start a search. However, as more detailed information is obtained, it may be reasonable to expand or reduce these boundaries. One method that can be used to set geographic limits is based on the relationship between cost and distance for various transport methods. We have not developed site-specific transport costs at this time. However, such cost information will be developed in the course of the FS, and this may be one type of information that will be used to further refine the geographic limits of the study area.

In addition to the specific search area provided by the above geographic limits, information on other potential sites outside these limits may become available through other means (i.e., word of mouth, regional documents, etc.). These sites will be considered (at least initially) regardless of their location relative to the above geographic boundaries. Distance and transport method (both relating to cost) will be the primary initial considerations use to determine whether these sites should be included in the disposal site inventory.



5 STEP 2: VOLUME ASSUMPTIONS

Because the FS has not yet been conducted, some general assumptions must be made about the volume of sediments that might require disposal for the purposes of Step 3 of the Disposal Facility Siting Evaluation. This information can be used to eliminate any sites that are clearly too small for further consideration.

The following basic factors affect the potential volume of sediments to be dredged and the resulting size of the disposal facility needed:

- The risk-based values or other approaches used to define “contaminated” sediments
- The areal extent of sediment contamination
- Depths of sediment contamination
- Amount of sediments remediated via dredging and disposal versus in-situ or treatment methods
- Depth of fill in the disposal facility
- Number of disposal facilities used (either at one time or in phases).

Based on these factors, a reasonable size range for a single disposal facility that would handle all of the project sediments is from approximately 30 to 200 acres. It is preferable to use a minimum estimate rather than a larger estimate, because this avoids prematurely screening out smaller sites. Also, it is possible that more than one site could be used. Consequently, a **minimum site size criterion of 5 acres** appears reasonable.



6 STEP 3: PRELIMINARY SCREENING AND DISPOSAL SITE INVENTORY REPORT

The preliminary site screening criteria were developed with the objective of eliminating early in the process areas that are technically, environmentally, economically, or otherwise unacceptable for further consideration. Generally, these criteria are expressed in exclusionary terms. That is, if a site does not meet the criteria it will be “excluded” from further consideration. However, some criteria will likely require more case-by-case judgments. In these cases, a site failing to meet the criterion will be “avoided” under most circumstances but may be included where the site has other potentially desirable characteristics.

The preliminary screening process is a simple one. We will examine aerial photos and topographic, bathymetric, geologic, soils, land/water use, and property maps. Based on this information, we will compare all sites within the geographic limits set in Step 2 against the criteria discussed below. Some criteria will require reference to additional sources of information, and these sources are discussed below for each criterion. The screening process will result in an inventory of potentially acceptable sites that pass all of the exclusionary criteria. There will be no relative ranking of these sites with the exception that any sites that do not pass one or more avoidance criteria will be categorized as secondary opportunities. The preliminary screening results will be presented in a Disposal Site Inventory Report after Round 1 Sampling has been conducted (Figure 1).

Proposed screening criteria are described in the following subsections segregated by disposal option type.

6.1 Criteria That Apply to All Disposal Options

The following criteria apply to upland, nearshore, and aquatic disposal sites.

6.1.1 Criterion 1: Site Size

As described in Step 2, the sites smaller than 5 acres in size will be excluded from further consideration.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.



6.1.2 Criterion 2: Steepness

The site cannot be overly steep. The exact determination of unacceptably steep sites will be made on a case-by-case basis and will differ for upland versus aquatic sites.

However, sites with slopes 10 to 20 percent (10 horizontal to 1 vertical [10H:1V] to 5H:1V) are generally considered marginal (avoided) and slopes greater than 20 percent are generally considered unacceptable (excluded). This criteria will be applied with consideration of special situations where surrounding bathymetry and topography may allow facility designs on steeper slopes (e.g., in a slip where a berm could be built across the existing mouth of the slip).

6.1.3 Criterion 3: Threatened or Endangered Species.

The presence of threatened or endangered species within or near a potential sediment disposal site has often been identified as a “fatal flaw” to site acceptability (Ecology 1990). Within this study area, almost all in-water disposal options can be considered to be generally within areas used by threatened or endangered fish species. However, no program in Oregon or Washington has ruled out disposal of sediments in water on this basis alone.

As existing information allows, in-water areas that have been identified as containing habitat of unique and/or outstanding value for threatened and endangered fish species will be excluded from further evaluation. Identification of these habitats will be primarily based on information provided and maintained by the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), Oregon Natural Heritage Program (ONHP), Oregon State Department of Fish and Wildlife (ODFW), Washington State Department of Fish and Wildlife (WDFW), and Washington State Department of Natural Resources (WDNR).

Similarly, if existing information identifies terrestrial/shoreline critical habitats and breeding areas for upland threatened or endangered species at or adjacent to a site, that site will be excluded from further consideration. The same sources of information as above will be used in this assessment.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



6.1.4 Criterion 4: Designated Parks, Sanctuaries, and Refuges

Potential sediment disposal sites in existing public parks, sanctuaries, preserves, or refuges will be excluded from further consideration.

6.1.5 Criterion 5: Tribal Land

Tribal territories and reservations will generally be avoided as disposal sites. However, if any specific tribe desires a particular site be considered on their land, these areas will be included where consistent with other screening criteria.

6.1.6 Criterion 6: Seismic Risk

Oregon State is a seismically active region. Damage can result from ground liquefaction or differential settlement during seismic events. Areas susceptible to violent shaking as defined by Oregon Department of Geology and Mineral Industries (2000) will be avoided. Although the artificial fill along shorelines can be susceptible to seismic shaking, past experience at similar sites in Puget Sound (e.g., Elliott and Commencement Bays) indicates that this condition can often be relatively easily mitigated through appropriate design. Accordingly, the presence of uncompacted fill or other materials susceptible to sliding (as identified by US Department of Agriculture [USDA] soils maps) will not necessarily constitute an unacceptable site condition but will be avoided.

6.2 Criteria That Apply to Upland Disposal**6.2.1 Criterion 7: Land Use**

Upland areas that are currently occupied by buildings, residences, or other structures, or that are used for parking areas, container yards, stockpile areas, or similar activities will be excluded from further consideration. This criterion will be evaluated through examination of aerial photos. This process may eliminate some potential sites where owners may be willing to consider selling land or otherwise converting from existing uses. However, this criterion provides a viable method to discriminate over a large area between sites with current economically viable uses and those that are generally vacant. If through other means it is determined that currently developed sites might be converted to a disposal site (after negotiation with owners, as appropriate), these areas would be included where consistent with other screening criteria.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



6.2.2 Criterion 8: Wetlands

Wetlands, as currently identified in City, County, State, and Federal inventories and including streams, ponds, and lakes will be excluded from further consideration. Some sites may contain small or hydrologically isolated wetlands, and historically, in some cases such sites can be filled under a Nationwide permit. However, there have been considerable changes (including several court decisions) recently to both Clean Water Act related regulations and USACE policies regarding when small or isolated wetlands can be filled using Nationwide permits. Consequently, we are not proposing specific definitions of small or isolated wetlands at this time. When the disposal site inventory is conducted, the prevailing determinations and policies at that time will be used to define wetlands that might reasonably be filled consistent with applicable wetland regulations. Thus, some sites with limited wetlands may be included in further evaluations.

6.3 Criteria That Apply to Nearshore and Aquatic Disposal

6.3.1 Criterion 9: Navigation Channels and Water Dependent Use

Federally authorized navigation channels will be avoided as possible nearshore and aquatic fill disposal sites. However, berthing areas located immediately adjacent to navigation channels can be preferred disposal locations, and thus are not excluded by this criterion. Sites that otherwise might reduce commerce or water dependent access (that is not a part of a specific berthing area that may be filled) will be avoided as disposal sites.

6.3.2 Criterion 10: Sensitive or Critical Aquatic Habitats

Sensitive or critical aquatic habitats (for example highly productive fish spawning areas or juvenile feeding and rearing areas) will be excluded as possible nearshore or aquatic disposal sites. Using the above example, critical fish habitats would have an abundance of attributes that juvenile fish need to feed or adult fish need to spawn. This evaluation will be made using sensitive or critical habitat inventories of USFWS, NMFS, ODFW, as well as city and county databases.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



6.3.3 Criterion 11: Tribal or Recreational Fishing Areas

Primary fishing areas currently used by tribes will be excluded as possible nearshore fill or aquatic disposal sites. Primary recreational fishing sites will be avoided. This information will be obtained from ODFW.

6.3.4 Criterion 12: Surface or Groundwater Discharge Areas

The presence of surface water inflows along the shoreline can affect the ability to design an effective nearshore disposal site that ensures long-term physical and chemical containment of sediment contaminants. Accordingly, primary surface water discharge areas will be avoided for nearshore sites.

Zones of preferential groundwater discharge or seeps can affect the ability to design effective nearshore and/or aquatic disposal sites. Accordingly, preferential groundwater discharge areas will be avoided for nearshore and aquatic sites.

This is not an exclusionary criterion because in many cases facilities can be designed to effectively deal with these discharges. However, these discharges can substantially complicate facility design.

6.3.5 Criterion 13: Currents

Strong currents capable of achieving bottom velocities above approximately 50 cm/sec (the rough threshold for incipient motion of sand-sized materials often considered for capping materials) can affect the long-term stability of nearshore or aquatic disposal sites. However, most of the areas to be considered are likely to periodically achieve these water velocities during high flow events. Further, nearshore and aquatic disposal facilities can be constructed and effectively armored against such currents.

Consequently, this is an avoidance criterion only. In general, areas that show evidence of high or repeated shoreline erosion or river bottom areas that are chiefly rock or hard scoured substrate will be avoided.



6.4 Criteria That Apply to Aquatic Disposal

6.4.1 Criterion 14: Mudline Slope

Existing mudline slopes of greater than 6 percent (16H:1V) are typically avoided for confined aquatic disposal sites to ensure site stability both during and after construction (Ecology 1990). However, through the use of berms or other retaining devices, aquatic disposal can be achieved on significantly steeper slopes. Mudline slopes exceeding 10 (10H:1V) percent will be excluded from further consideration.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.



7 STEP 4: VOLUME AND OTHER CHARACTERISTICS REFINEMENT

The first three steps in the facility siting process will yield a preliminary list of potential disposal sites presented in the Disposal Site Inventory Report. Information gathered during the course of the RI/FS process on sediments to be remediated will be useful in ruling out some disposal sites on the Disposal Site Inventory. The most important piece of information will likely be the volume of sediments requiring disposal. However, information on other characteristics that could also be useful include:

- **Grain Size and Organic Carbon Content:** If the majority of sediments to be dredged are particularly fine or colloidal in nature, this could greatly impact handling and disposal requirements. Grain size is relevant to Criteria 1, 2, 6, 12, 13, and 14
- **Geotechnical Strengths:** Geotechnical strengths affect many aspects of disposal including compaction and slumping, and are relevant to Criteria 1, 2, 6, 12, 13, and 14
- **Natural Water Content.** The natural water content of the sediments affects the extent of leachate and dewatering control and treatment needed. Water content is relevant to Criteria 1, 6, and 12
- **Chemical Concentrations:** The contaminant concentrations in the dredged material may affect determination of acceptable dredge methods, leachate quality, dewater quality, and entrained water disposal treatment and disposal requirements. Chemical concentrations are relevant to Criteria 1 and 12.

Some Step 4 information will be available after Round 1 sampling (particularly grain size, water content and chemical concentrations). Additional Step 4 information will be available after Round 2 sampling (particularly geotechnical data) including additional information on areas most likely to be remediated. This information will not be separately presented or reported for the Facility Siting Process but will be used in Step 5 or/and Step 6 described below.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.



8 STEP 5: RESCREEN SITES (OPTIONAL)

Based on the information obtained in Step 4, the Disposal Site Inventory may be rescreened against the same criteria shown in Step 3. Volume is expected to be the primary factor resulting in refinement of the Disposal Site Inventory. However, in some cases the sampling information may not provide a clear means to further eliminate sites on the inventory and/or too few sites may be on the inventory to make Step 5 useful. In these cases, we will proceed directly to Step 6 following the general schedule shown in Figure 1.

If Step 5 is conducted, additional information gathered in the two rounds of sampling will be evaluated to determine whether there are any other important characteristics of the Lower Willamette River or the contaminated sediments that could be used to differentiate between potential sites. For example, it is expected that the two sampling rounds will provide considerable insight on the physical dynamics of the river, which may be very helpful in siting nearshore and aquatic sites in particular.

This step is left purposely flexible. That is, we will not try to define any new refining criteria in detail here. This is because it appears that the types and extent of useful information obtained out of the two rounds of sampling is not entirely predictable at this point.

Any new criteria and the rescreening results (if conducted) will be presented in a Rescreening Report, which will be submitted at the same time or prior to the RI/Risk Assessment (RA) Report (Figure 1). The Rescreening Report will be a separate document from the RI/RA Report.



9 STEP 6: FINAL SITE RANKING

In Step 6, additional information will be gathered on each site in the Disposal Site Inventory (or the Rescreened List if Step 5 is conducted) sufficient to briefly evaluate them against CERCLA-based criteria: effectiveness (including ecological impacts), implementability, and cost.

Although these criteria are typically applied to remedial options, the same issues are relevant to selecting the most appropriate sites for disposal. This process has been used successfully at other aquatic Superfund sites including the Hylebos Waterway in Tacoma, Washington (Hartman et al. 1997).

Use of the CERCLA-based criteria should not be confused with the overall project FS evaluations, which will be conducted for the full range of remedial options (not just disposal options). The overall project FS will use the sites obtained through Step 6 of the Disposal Facility Siting Evaluation (and other information) to evaluate disposal remedial options in comparison to other remedial options (such as capping, natural attenuation, treatment, etc.).

The specific criteria that will be used for Step 6 are discussed below. These criteria will be evaluated using existing information gathered for each site on the refined list. It is not anticipated that additional sampling or survey work will be conducted for each site (e.g., site-specific groundwater sampling, topographic surveys, habitat surveys, chemical sampling, etc.). However, the project FS may determine the need for such sampling or surveys in order to fully evaluate disposal as a remedial option at a particular site, and such work would be conducted at that time (most likely Round 3 sampling). Specific sources of existing information that may be useful are discussed for each criterion.

9.1 Disposal Site Effectiveness

For the purposes of the facility siting process, effectiveness potentially afforded by a particular site on the refined list includes evaluation of the following issues:

- Long-term protection of human health and the environment
 - Contaminant mobility after construction (e.g., migration, diffusion, and dispersion)
 - Leachate quality (with or without treatment)
 - Erosion and/or physical loss

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



- Exposure pathways from proposed site uses

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

*This document is currently under review by US EPA and its federal,
state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.*



- Short-term protection of human health and the environment (during construction)
 - Contaminant loss during dredging, transport, rehandling, and disposal
 - Dewater discharge quality (with or without treatment)
 - Worker exposures necessary to construct the site
- Potential ecological impacts of using the site
 - Existing ecological functions, abundance, diversity
 - Proposed ecological functions, abundance, diversity
 - Temporary ecological impacts.
- Potential ecological enhancements of using the site
 - Existing ecological functions, abundance, diversity
 - Proposed ecological functions, abundance, diversity

The characteristics of each site on the refined list will be evaluated relative to these issues.

Typical evaluations might include:

- Are there any characteristics of the site like groundwater flow rates or water currents that make it difficult to isolate contaminants from the environment?
- Will handling and transport required to place sediments at the site present potential short-term impacts or loss of contaminants to the environment?
- Are there ecological functions at the site that will be improved, reduced, or eliminated by use of the site?

Existing information will be obtained through regulatory agency files, City and County files on the site, site owner files, and interviews with site owners or adjacent owners. This may include gathering of information on the site in question or adjacent sites.

9.2 Disposal Site Implementability

For the purposes of the facility siting process, the implementability of a particular site on the refined list will include evaluation of the following issues:

- Transport and handling logistics
- Access issues

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



- Placement logistics such as dewatering, water treatment
- Locations and requirements of capping and/or liner materials
- Geotechnical constraints, slope, depths of water
- Long term operation and monitoring requirements
- Ability to meet the Applicable or Relevant and Appropriate Requirements (ARARs)
- Local zoning and regional land use plans
- Existing and planned site uses
- Owner acceptance (and/or willingness to sell land)
- Adjacent property uses
- Management and administrative structure during disposal
- Political and community acceptance
- Cultural resource constraints
- Distance from dredging area
- Storage capacity
- Availability of necessary equipment and skilled workers.

Many of the issues related to engineering the facility (e.g., transport, access, distance) will be readily apparent from the location and physical characteristics of the site. ARAR and land use information will be obtained from State, City, and County files and regulations as well as interviews with landowners and adjacent landowners. Future site uses and owner acceptance may only be identifiable through detailed negotiations with landowners. Availability of equipment and workers will be determined through interviews with potential local contractors.

9.3 Disposal Site Cost

Many of the issues related to implementability also directly effect costs. A planning level (order-of-magnitude) cost estimate will be prepared based on the theoretical use of each site. For the purposes of this facility siting process, cost for a particular site on the refined list will include evaluation of the following issues:

- Design and bid costs
- Site acquisition costs
- Dredging costs (considers removal method that is suitable for disposal site)
- Transport costs (e.g., barge, rail, truck, distances, etc.)

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



- Handling/rehandling costs (e.g., stockpiling)
- Disposal costs (e.g., placement)
- Tipping or other fees
- Dewatering costs (with or without treatment)
- Ancillary feature costs (dikes, berms, caps, liners, armoring, fencing, vegetation, habitat features, leachate collection systems, water treatment, hydraulic gradient controls, etc.)
- Site operation and maintenance costs
- Short- and long-term monitoring costs
- Mitigation costs, to the extent this can be determined
- Cost sharing availability, to the extent this can be determined (e.g., owner development opportunities)
- Natural Resource Damage Assessment (NRDA) restoration credit value
- Value of any habitat, endangered species, or other enhancements created.

Most of this cost information will be available for the purposes of planning level cost estimates through information from contractors, disposal site owners/operators, and standard engineering costing guidance. Mitigation costs, cost sharing, and NRDA restoration credit value may be difficult to assess at this stage in the project. Reasonable estimates will be made given agency policies and informal discussions with agency representatives.

9.4 Final Site Ranking

Unlike the preliminary screening and rescreening steps, the final list of sites will be ranked relative to their expected performance against the criteria. Each site will be given a score from 0 to 5 for each of the three major criteria: effectiveness, implementability, and cost. These scores will be added on an equal weighting basis to yield overall scores from 0 to 15. Highest scoring sites will be considered first in the project FS. In addition, the process of gathering information and evaluating against the criteria may reveal fatal flaws with the site (e.g., an owner indicates complete unwillingness to negotiate site use). In these cases, the site will be removed from the refined list and not included in the final ranking.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE



The final site ranking will be presented in a report, which will be part of the Assemble and Document Alternatives Technical Memorandum (Section 9.1.5 of the SOW) (Figure 2).

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

*This document is currently under review by US EPA and its federal,
state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.*



10 REFERENCES

- Ecology, Washington State Department of. 1990. Standards for Confined Disposal of Contaminated Sediments. Olympia, Washington.
- Hartman Consulting; Dalton Olmstead & Fugelvand, Inc., Parametrix, Inc.; and Aura Nova Consultants. 1997. Hylebos Waterway Pre-Remedial Design Preliminary Disposal Site Evaluation. Prepared for the Hylebos Cleanup Committee. Seattle, Washington.
- Oregon Department of Geology and Mineral Industries. 2000. Earthquake Scenario and Probabilistic Ground Shaking Maps for the Portland, Oregon, Metropolitan Area. Interpretive Map Series IMS-15. Portland, Oregon.
- Port of Portland. 1996. Dredge Material Management Study. Prepared by Ogden Beeman Associates and Hartman Consulting. Portland, Oregon.
- U.S. Army Corps of Engineers, Portland District. 1998. Columbia And Lower Willamette River Navigation Channel Integrated Dredged Material Management Study (DMMS) and Supplemental Environmental Impact Statement (SEIS). Portland, Oregon.

DRAFT DOCUMENT: DO NOT QUOTE OR CITE

This document is currently under review by US EPA and its federal, state and tribal partners, and is subject to change in whole or part.
Draft Disposal Facility Siting Technical Memo.

